

# **Boeing GLS Autoland Demonstration at Juneau**

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## Biography:

- **Boeing Flight Test Engineer since 1997**
- **Associate Technical Fellow (ATF) and FAA Flight Test Analyst AR for Automatic Controls and Sensors**
- **Flight Test GLS/GBAS SME**
- **Lead for flight test development and FAA certification of GLS for Boeing airplanes since 2001**
- **Graduate of the University of Washington's School of Aeronautical and Astronautical Engineering**

- **Juneau Test Team**
- **Why Juneau?**
- **Juneau Test Planning**
- **Juneau Video**
- **Results**

**Boeing 737 Project Pilot**  
**Qantas Technical Pilot**  
**Alaska Technical Pilot**  
**FAA Pilot**

**ILS GUIDANCE NOT POSSIBLE DUE TO GEOGRAPHIC LIMITATIONS**

**APPROACH MINIMUMS:**

**336 FT FOR RUNWAY 26**

**1800 FT FOR RUNWAY 08**

**NEAREST ALTERNATE IS ANCHORAGE (500 NM AWAY, SEATTLE 800 NM AWAY)**

**GLS IDEALLY SUITED FOR THIS PROBLEM**

**ANALYSIS OF THE GEOGRAPHY AND 737NG CAPABILITIES INDICATED THAT WE COULD COMPLETE GLS AUTOLANDS**

# Seriously?

787  
DREAMLINER

## Approach to Runway 26 down the Gastineau Channel



# Why Juneau?

787  
DREAMLINER

## Approach End of Runway 08 (Pedersen Hill)



# Juneau Int'l Airport



3000 ft

600 ft

1.2 nm

08

I-JDL

Localizer / Visual Approach

26

3000 ft

2.5 nm

LEMN

1.6 nm

Special RNP Approach

2200 ft

2800 ft

2.23 ml

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Streaming ||||| 100%

58°20'10.88" N 134°32'12.52" W elev 205 ft



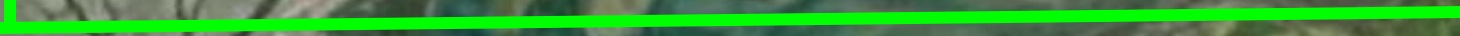
# GLS Approach Definition



Threshold and / or Displaced Threshold Coordinates (WGS84)  
Provides Horizontal Data

G/S angle

TCH = Threshold Crossing Height



Provides Vertical Data

2746 ft

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## Runway 08

G/S Angle	Threshold Displacement
<b>4.00</b>	<b>None</b>
<b>4.00</b>	<b>1000'</b>
<b>3.50</b>	<b>1000'</b>
<b>3.50</b>	<b>2000'</b>
<b>4.00</b>	<b>Pond</b>

## Runway 26

G/S angle	Threshold Displacement
<b>3.50</b>	<b>None</b>
<b>3.50</b>	<b>1000'</b>
<b>3.00</b>	<b>2000'</b>

# Runway 08 BJNU: 4 deg G/S 1000' Displaced Threshold



Problem #1: MISS Pedersen Hill!

Elevations enhanced x3

# Runway 26 GJNU: 3 deg G/S 2000' Displaced Threshold



LEMN  
600'

Problem #1: Turn the corner  
Problem #2: Time to FLARE Engage  
While you're at it – miss the mountains!

Elevations enhanced x3

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1624 ft



**30 June 2008**

**First Autolands Completed at  
Juneau, Alaska**

JUNEAU GLS AUTOLANDS

ALASKA AIRLINES  
QANTAS AIRLINES  
THE BOEING COMPANY

JUNEAU GLS AUTOLANDS

ALASKA AIRLINES  
QANTAS AIRLINES  
THE BOEING COMPANY

- **GLS guidance does enable autolands at Juneau**
- **Currently 737NG, 737 MAX, 747-8, 787, and KC-46 are GLS Capable**
- **Boeing has installed 2 SLS-4000 GBAS stations for testing:**
  - **Moses Lake, Washington**
  - **Charleston, South Carolina**
- **Publically available GBAS stations:**
  - **Newark, New Jersey**
  - **Houston, Texas**
- **Planned installations:**
  - **Seattle/Tacoma (2018)**
  - **San Francisco (~2020)**